

12/22/17 "Hope is an accelerant."-Mrs. Lenoci

HW: "Synthetic Division of Polynomials" worksheet #2-10 even

AIM: How do we use Synthetic Division?

Warm Up:

1) Use long division to divide:

$$(2x^3 - 9x^2 + 10x - 7) \div (x - 3)$$

$$\begin{array}{r}
 2x^2 - 3x + 1 - \frac{4}{x-3} \\
 x-3 \overline{) 2x^3 - 9x^2 + 10x - 7} \\
 \underline{-(2x^3 - 6x^2)} \downarrow \\
 -3x^2 + 10x \\
 \underline{-(-3x^2 + 9x)} \downarrow \\
 1x - 7 \\
 \underline{-(1x - 3)} \\
 -4
 \end{array}$$

$$2x^2 - 3x + 1 - \frac{4}{x-3}$$

Is there another way to find the quotient and remainder of the warm up?

Synthetic Division

$$(2x^3 - 9x^2 + 10x - 7) \div (x - 3)$$

Steps

- 1) First, write the coefficients ONLY inside an upside-down division symbol:

$$\begin{array}{r|rrrr} & 2 & -9 & 10 & -7 \end{array}$$

- 2) Solve the divisor for x and place that value outside

$$x - 3 = 0$$

$$x = 3$$

$$\begin{array}{r|rrrr} 3 & 2 & -9 & 10 & -7 \end{array}$$

- 3) Take the first number inside, representing the leading coefficient, and carry it down, unchanged, to below the division symbol:

$$\begin{array}{r|rrrr} 3 & 2 & -9 & 10 & -7 \\ & 2 & & & \end{array}$$

- 4) Multiply the outside value by the carry down value and place that number under the second coefficient

$$\begin{array}{r|rrrr} 3 & 2 & -9 & 10 & -7 \\ & 2 & 6 & & \end{array}$$

- 5) Add down the column:

$$\begin{array}{r|rrrr} 3 & 2 & -9 & 10 & -7 \\ & 2 & 6 & & \\ & & -3 & & \end{array}$$

- 6) Multiply the result by the outside value and place the result under the third coefficient

$$\begin{array}{r|rrrr} 3 & 2 & -9 & 10 & -7 \\ & 2 & 6 & -9 & \\ & & -3 & 1 & \end{array}$$

- 7) Repeat the process until there are no columns remaining

$$\begin{array}{r|rrrr} 3 & 2 & -9 & 10 & -7 \\ & 2 & 6 & -9 & 3 \\ & & -3 & 1 & -4 \end{array}$$

- 8) The last value is the remainder and the remaining values are the coefficients of the quotient, right to left in ascending order

$$2x^2 - 3x + 1 + \frac{-4}{x - 3}$$

Use Synthetic Division to find the quotient and remainder of the following:

$$1) (x^3 - 2x^2 - 5x + 6) \div (x - 3)$$

$x = 3$

$$\begin{array}{r|rrrr} 3 & 1 & -2 & -5 & 6 \\ & \downarrow \oplus 3 & \oplus 3 & \oplus -6 & \\ \hline & 1 & 1 & -2 & 0 \end{array}$$

← no remainder

$x^2 + x - 2$

$$3) (2x^3 + x^2 - 3x + 7) \div (x + 1)$$

$x = -1$

$$\begin{array}{r|rrrr} -1 & 2 & 1 & -3 & 7 \\ & & -2 & 1 & 2 \\ \hline & 2 & -1 & -2 & 9 \end{array}$$

$2x^2 - x - 2 + \frac{9}{x+1}$

$$5) (x^4 - 3x^3 + 7x^2 - 2x + 1) \div (x + 2)$$

$$\begin{array}{r|rrrrr} -2 & 1 & -3 & 7 & -2 & 1 \\ & & -2 & 10 & -34 & 72 \\ \hline & 1 & -5 & 17 & -36 & 73 \end{array}$$

$x^3 - 5x^2 + 17x - 36 + \frac{73}{x+2}$

$$7) (3x^4 + x^3 - 2x + 3) \div (x + 1)$$

$\text{No } x^2$

$$\begin{array}{r|rrrrr} -1 & 3 & 1 & 0 & -2 & 3 \\ & & -3 & 2 & -2 & 4 \\ \hline & 3 & -2 & 2 & -4 & 7 \end{array}$$

$3x^3 - 2x^2 + 2x - 4 + \frac{7}{x+1}$

$$9) (x^4 - 16) \div (x - 2)$$

$$\begin{array}{r|rrrrr} 2 & 1 & 0 & 0 & 0 & -16 \\ & & 2 & 4 & 8 & 16 \\ \hline & 1 & 2 & 4 & 8 & 0 \end{array}$$

$x^3 + 2x^2 + 4x + 8$

